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VALIDATING AND TESTING THE RELIABILITY OF THE DEVELOPED SAND CASTING INSTRUCTIONAL VIDEO PACKAGE FOR EFFECTIVE TEACHING AT TECHNICAL COLLEGE LEVEL IN NIGERIA

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ABSTRACT

The study is on validating and testing the reliability of the developed sand casting instructional video package for effective teaching at technical college level in Nigeria. Two research questions were raised. Related literature was reviewed. Sand Casting Achievement Test was developed (SCAT). A sample of 15 NTC II students from Government Science and Technical College Kwami was used for the reliability test. The frequency count, mean and standard deviation for individual respondents, Cronbach alpha was used to test the degree of reliability of each domain and the entire test from the sample school. Based on the findings the developed instructional video package was found valid and reliable for effective teaching.

KEYWORDS: Validity, Reliability, Developed Instructional Video Package, Sand Casting.

1. INTRODUCTION

Instructional materials are in various categories, such as sound or audio, visual or auditory. Thus, audio instructional materials refer to those devices that make sense of hearing only, such as radio, a recorded audio tape. Visual material on the other hand, is a teaching material that appeals to the sense of sight just like Blackboard and outline, slides, and film. An audio-visual instructional material, however, is a combination of devices that appeal to both the senses of listening and watching such as the TV film and computer. Among the instructional materials used by the teacher in the classroom, the visuals outnumbered the combination of the audio and audio-visual (Paiko, 2014).

Development of an instructional model, material, software package or instrument for teaching plays a significant role in supplementing conventional method of instruction in our educational system particularly in TVET schools as the Information Communication Technology (ICT) is one of technology that is revolutionizing today's classroom activities. Tremendous growth is being witnessed in the use of information technology for teaching and learning, and in no doubt, the trend will continue and will change the ways teachers view teaching. It is important for every technology teacher to acknowledge and appreciate the use of valid and reliable developed instructional video in teaching.

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Validity of instruments, according to Nwabueze (2009) is the degree to which a test measures what it is designed or made to measure. An instrument with high validity will measure accurately the particular qualities it is supposed to measure. In the views of Ali, Olaitan, Eyo and Swande (2014) validity of a measuring instrument is the property of a measure that helps to ensure that the instrument measures what it supposes to measure. In other words, the validity of developed instructional video aid is the extent to which the students intended practical competencies outlined in the curriculum are covered by the test items. Test used for assessing students should be valid and reliable.

Reliability of a measuring instrument, in Ofuebe & Izueke (2011) is the ability of the instrument to measure consistently the phenomenon it is designed to measure. Reliability therefore means the consistency with which an instrument measures whatever it measures. The use of valid and reliable developed instructional video instrument for teaching sand casting at NTC II students in mechanical engineering craft practice will ensure that students are taught the proper or effective way of carrying out the tasks and involved in sand casting.

Teaching without valid and reliable instructional material makes the evaluation or the process of imparting practical and theoretical knowledge to the students incomplete, therefore, finds it worthwhile to validate and test the reliability of the developed sand casting instructional video package for effective teaching at NTC II technical college level in Nigeria.

II. AIM AND OBJECTIVES

The main aim of the study is to validate it and test for its reliability of the developed sand casting instructional video package for effective teaching at Technical College level. Specifically, the study sought to achieve the following objectives:

i. To determine the validity of the developed instructional video package for teaching sand casting at technical college level.
ii. To determine the reliability of the developed instructional video package for teaching sand casting at technical college level.

III. RESEARCH QUESTIONS

The following research questions guided the study:

i. What is the validity of the developed instructional video package for teaching sand casting at technical college level?
ii. What is the reliability of the developed instructional video package for teaching sand casting at technical colleges?

IV. VALIDATION AND RELIABILITY OF INSTRUMENT

Validity of an instrument, according to Nwabueze (2009) is the degree to which a test measures what it is designed or made to measure. An instrument with high validity will measure accurately the

particular qualities it is supposed to measure. In the views of Ali, Olaitan, Eyo and Swande (2000) validity of a measuring instrument is the property of a measure that helps to ensure that the instrument measures what it is supposed to measure.

Face validity in the view of Ukonze (2010) is the degree to which the items in the test appear to measure what it ought to be measuring. Anyaokoha (2009) stated that a test is said to have face validity if it looks like going to measure what it is made to measure. Face validity is the extent to which the items in the sand casting achievement test appear to measure the process skills in the course content of mechanical engineering craft in technical colleges.

According to Akujo & George (2010) content validity of a test is its ability to measure the subject matter content in relation to the instructional objectives. Akwaji (2006) stated that the content validity of a test is when the items of the test are representative of a universe of items that is comprehensive enough to represent the presumed objectives of the curriculum.

Reliability of a measuring instrument and instructional package in Ofuebe & Izueke (2011) is the ability of the instrument to measure consistently the phenomenon it is designed to measure. Reliability therefore means the consistency with which an instrument measures whatever it measures. The use of valid and reliable instructional video package and sand casting achievement test for teaching and assessing NTC students in mechanical engineering craft will ensure that students are taught the proper way of carrying out tasks. In technical colleges, assessment of students' learning in relation to the achievement of the objectives of mechanical engineering craft is carried out after classroom instructions by the teachers and NABTEB at the final examination using marking scheme checklist.

Technical colleges provide technical and vocational training for quite a number of occupations including woodwork, metalwork, mechanical engineering craft practice, electrical installation, etc. (Olaitan,2011). The duration of training is three years, leading to the award of National Technical Certificate (NTC). Also available in some technical colleges are advance course leading to the award of Advanced National Technical Certificate (ANTC) or Advanced National Business Certificate (ANBC) in the various field of study (NBTE 2003).

Mechanical engineering craft practice is one of the core trades or programmes offered in almost all the technical colleges in the country. The aim of this programme is to train and graduate a sub-professional mechanical engineer biased in production engineering (manufacturing). The NBTE curriculum calls them craftsmen. Yalams (2001) in describing the mechanical engineering craftsmen said they are sub-professional production and maintenance engineers. They work in the manufacturing industries, which ranges from electronics to pharmaceuticals and from plastics to food processing.

Foundry technology can be seen as a method of producing metal components by melting the metal, pouring it into prepared cavity called mould made using a pattern which is a copy of the item to be

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produced and allowing it to solidify to take the shape of the pattern. The process is called casting and also it is the name given to the part produced.

V. METHODOLOGY

Research Question 1.

The validation was done in three stages;

Experts' questionnaire, Teachers' questionnaire and Province Edward Department of Education DVD/Video validation questionnaire

The first or preliminary data collected for developing the sand casting instructional video for teaching was content validation, and was carried out by three experts from Vocational and Technology Education Department, ATBU Bauchi. The draft copy of production scripts, Sand Casting Achievement Test instrument, table of specification, identified task area in Foundry Shop Safety Precautions, Sand Casting Tools and Equipment, Pattern and pattern making, Mold and core making, and Sand Casting Process in NABTEB curriculum in foundry technology content at NTC technical college level and four rating scale questionnaire were submitted to the experts. The experts examined the structure of the items, determined the extent to which the items helped to achieve the objectives of the topic, determined the extent to which the table of specification is correct with respect to the topic covered and also they were ask to reword, reviewed, restructure or delete where necessary.

The second stage of the validation was done on the revised test form of instruments by technical college teachers and workshop instructors in mechanical engineering craft practice from Government technical colleges in Gombe state. Three teachers and two workshop instructors rated the instrument on knowledge, skill and attitudes. They were requires to determine the test items that were appropriate for inclusion in the instrument by rating each item in terms of their perceived level of appropriateness. Therefore, the corrections and suggestions from the university, technical college teachers and workshop technologist were utilized in improving the instrument. The resulting data obtained was used for construct validation of the instrument.

Also, after developing the video, the study then adopted Province Edward Island Department of Education (2008) DVD/Video validation questionnaire, the questionnaire were made available to three experts also. The three experts were invited by the researcher, two from Educational Technology Department and one from Metal Work Technology Education Department of Federal College of Education (T) Gombe to validate the developed instructional video using the Province Edwards Island Department of Education (2008) DVD/Video validation form. This was made possible by training them on how to use the DVD/Video validation form. After watching the developed instructional video twice, the DVD/Video questionnaire was administered by the researcher on the experts. They were required to examine the instructional video package based on content; instructional design and technical design based on four likert scale. The corrections and suggestion were utilized in improving the final production phase. This was done by inputting the data into SPSS software package which automatically computes the frequency count, mean and standard deviation for individual respondents.

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Decision Rule

For selecting the multi-choice task and skills considered appropriate for inclusion in the knowledge, affective domain and psychomotor/process skill test, a mean of 2.50 and above was utilized. Any item with 2.50 and above was appropriate and any item with a mean of less than 2.50 was not appropriate for the inclusion.

The decision rule for tables containing strongly agreed-not-applicable linkert scale is that any item with a 2.50 and above is considered acceptable while mean responses that are less than 2.50 are considered not acceptable, being rejected.

Research Question 2

Reliability of the Instrument

The pilot testing was carried out by showing the developed sand casting instructional to the sample students after watching the video the research assistant administered the test items to a sample of 15 students in one intact mechanical engineering craft class of NTC II students at Government Science Technical College, Yola. This subject were not involved in the main study but was equivalent samples of the group for which the instrument was developed for and tested and the test covered the lessons on the topic chosen from the developed sand casting instructional video. Trial testing was done in order to determine the reliability of the instrument. The scripts were scored and the scores were recorded. To estimate the reliability coefficient of the instrument, the data collected from the SCAT was subjected to a reliability test and analyzed using Cronbach alpha reliability coefficient. Thus, the reliability test yielded coefficient of 0.89 for knowledge with 0.79 on affective whereas 0.86 on psychomotor.

VI. RESULTS

Research Question One

What is the validity of the developed instructional video package for teaching sand casting at technical colleges?

To answer the research question, the table of specification constructed based on Anderson (2001) model on knowledge domain revealed that in foundry shop safety precautions out of 15 items, 4 is factual knowledge, two item is on remember; 2 items on understanding; none on apply; none on analysis; none on evaluate and none on create. While conceptual knowledge out of seven items five items are on remember; two on understand; none on apply; none on analysis; none in evaluate and none in create. On procedural knowledge out of four items one item is on remember; one on understand; one on apply; one on analysis; none in evaluate and none in create while meta-cognitive knowledge had no item in all the cognitive domain dimensions in foundry shop safety precautions.

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Furthermore, in sand casting tools and equipment out of 9 items, 4 is factual knowledge, two items is on remember; one item on understanding; none on apply; one on analysis; none on evaluate and none on create. On conceptual knowledge out of two items one items are on remembered; one on understand; none on apply; none on analysis; none in evaluate and none in create. Also, On procedural knowledge out of three items one item is on remember; two on understand; none on apply; none on analysis; none in evaluate and none in create while meta cognitive knowledge had no item in all the cognitive domain dimensions in sand casting tools and equipment.

In pattern and pattern making out of 11 items, 6 is factual knowledge, three items are on remember; two items on understanding; none on apply; none on analysis; none on evaluate and one on create. On conceptual knowledge out of three items two items are on remember; one on understand; none on apply; none on analysis; none in evaluate and none in create. In procedural knowledge out of two items one item is on remembered; one on understand; none on apply; none on analysis; none in evaluate and none in create. While Meta cognitive knowledge had no item in all the cognitive domain dimensions in pattern and pattern making.

Also, mold and core making out of 15 items, 7 is factual knowledge, one item is on remember; three items on understanding; two on apply; none on analysis; one on evaluate and none on create. On conceptual knowledge out of five items one items are on remember; two on understand; one on apply; one on analysis; none in evaluate and none in create. In On procedural knowledge out of three items one item is on remember; one on understand; one on apply; none on analysis; none in evaluate and none in create while meta cognitive knowledge had no item in all the cognitive domain dimensions mold and core making.

Finally, in casting process out of 10 items, 4 is factual knowledge, two item are on remember; two items on understanding; none on apply; none on analysis; none on evaluate and none on create. On conceptual knowledge out of four items none of the items are on remember; one on understand; two on apply; none on analysis; none in evaluate and none in create. On procedural knowledge out of two items one item is on remember; one on understand; none on apply; none on analysis; none in evaluate and none in create while meta cognitive knowledge had no item in all the cognitive domain dimensions in casting techniques.

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Table 1: Specification on Knowledge Matrix of Knowledge in the Following Content Area:

Content Area	Knowledge dimensions	Cognitive Dimensions						Total
		Remember	Understand	Apply	Analyze	Evaluate	Create	
	Factual	1, 3 (2)	2, 4 (2)	-	-	-	-	4
1 Safety	Conceptual	6, 7, 10, 8, 9 (5)	5, 11 (2)					**7**
	Procedural	13 (1)	12 (1)	14 (1)	15 (1)	-	-	4
	Meta-cognitive	-	-	-	-	-	-	-
Total		**8**	**5**	**1**	**1**			**15**
	Factual	16, 19 (2)	18 (1)	-	17 (1)	-	-	4
2 Tools	Conceptua	20 (1)	21 (1)	-	-	-	-	2
	Procedural	22 (1)	23, 24 (2)	-	-	-	-	3
	Meta-cogni.	-	-	-	-	-	-	-
Total		**4**	**4**		**1**			**9**
	Factual	25, 30, 28 (3)	27, 29 (2)	-	-	-	26 (1)	6
3 Pattern	Conceptual	31, 34 (2)	32 (1)	-	-	-	-	3
	Procedural	34 (1)	(33) (1)	-	-	-	-	2
	Meta-cogn.	-	-	-	-	-	-	-
Total		**6**	**4**				**1**	**11**
	Factual	36 (1)	37, 41, 35 (3)	38, 42 (2)	-	39 (1)	-	7
4 Mold	Conceptual	48 (1)	43, 44 (2)	47 (1)	39 (1)	-	-	5
	Procedural	40 (1)	45 (1)	46 (1)				3
Total		**3**	**6**	**4**	**1**	**1**		**15**
	Factual	49, 51 (2)	50,52 (2)	-	-	-	-	4
5 Casting Technique	Conceptual	-	53 (1)	54, 55 (2)	56 (1)	-	-	4
	Procedural	58 (1)	59 (1)	-	-	-	-	**2**
Total		**3**	**4**	**2**	1	-	-	**10**
	G/total	**24**	**23**	**7**	**4**	**1**	**1**	**60**

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In affective domain of learning, a table of specification was constructed based on Bloom, Krathwhol and Madia (1973) Model on affective domain was used and factors that border on attitude namely; emotional stability, honesty, trustworthiness, were considered

Table 2: Specification on Attitude (Affective Domain (Matrix in affective domain)

	Receiving	Responding	Valuing	Organizing	Internalizing	Total
Emotional stability						
Honesty			69			6.7
Teamwork	60			61		13.4
Agreeableness		62			64	13.4
Optimism		65		63		13.4
Discipline at workplace	68	67 71	70	66		33
Conscientiousness		64	72		73	20.1
Total	13.5%	33%	20%	20%	13.5%	**100%**

On skill (psychomotor) domain of learning, Simpson (1972) Model on psychomotor domain of learning was used. The dimensions include perception, set, guided response, mechanism, complex overt response, adaption and origination. The seven task in sand casting process; six items on perception, 15 items set, 8 guided response, 7 item on mechanism, 24 items on complex overt response, none items on adaption and non items on origination.

However, before arriving at the above stage selecting draft test items were submitted to the 3 experts in DVTE ATBU Bauchi who reviewed the appropriate of the items and made satisfactory comments in some areas.

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Table 3: specification of Psycho motor (skill)

S/no.	Contents	SIMPSON TAXONOMY							Total	% of Total of items
		Perception	Set	Guided Response	Mechanism	Complex Over Response	Adaption	Origination		
1	Pattern Making	6,14,15 **(3)**	1,2,3,7,8,9,12, 11,13,27,23 **(11)**	20,24,25,26,28 **(5)**	22,21,18,29 **(4)**	4,5,10,19,17,16 **(6)**	-	-	**29**	46.4
2	Mold Making	30,44 **(2)**	31,34,40 **(3)**	33,39 **(2)**	47 **(1)**	32,35.36,37,38,41 ,42,43,44,45,48,49,50 **(13)**	-	-	**21**	36.6
3	Casting Techniques	51 **(1)**	52 **(1)**	57 **(1)**	54, 56 **(2)**	53,55,58,59,60 **(5)**			**10**	17
Total		**6**	**15**	**8**	**7**	**24**	-	-	**60**	
% of total items		10%	25%	13%	12%	48%				**100%**

Analysis in Table 4 shows the responses of experts on the developed sand casting instructional video for teaching. Where responses based on content shows 8 items 1-8 and all were accepted while table 15 shows that 15 items based on instructional design all were accepted except item 14, 22, and 23 showing negative results therefore were rejected. Table 16 shows10 items on technical design, 9 were accepted and only item 31 was rejected. Research question two has three important aspects: content validity, instructional design validity and technical design validity.

Table 4: Mean responses of experts on sand casting video instructional package on content

		Freq. Count					
S/No.	**Item Statement**	**SA**	**A**	**D**	**NA**	**Mean**	**Remark**
1	Content is current	1	2	0	0	3.33	Agreed
2	Accuracy of the content	0	3	0	0	3.00	Agreed
3	Scope and depth of topics are appropriate to students need	1	2	O	0	3.33	Agree
4	Content support NBTE curriculum	2	1	0	0	3.67	Agreed
5	Scope (range) and depth of topics are appropriate to students need	1	1	1	0	3.00	Agreed
6	Materials has significant to Nigerian content	1	2	0	0	3.33	Agreed
7	Level of difficulty is appropriate for intended audience	1	2	0	0	3.33	Agreed
8	Contents integrate ‘’real world’’ experience	1	2	0	0	3.33	Agreed

Key:

SA -Strongly Agreed
A- Agreed
D- Disagreed
NA- Not applicable

Table 5: Mean responses of experts on sand casting video package on instructional design

S/No.	Item Statement	Freq. Count SA	A	D	NA	Mean	Remark
9	Instructional goals and learners objectives are clearly stated	2	1	0	0	3.67	Agreed
10	Resources is suitable for a wide range of teaching/learning styles	2	1	0	0	3.67	Agreed
11	Resources promote students engagement	1	2	0	0	3.33	Agreed
12	Methodology promotes student active learning	1	2	0	0	3.33	Agreed
13	Resources encourages group interaction	0	3	0	0	3.00	Agreed
14	Resources encourage student creativity	1	1	0	0	2.33	Disagreed
15	Concepts are clearly introduced	0	3	0	0	3.00	Agreed
16	Concepts are clearly developed	2	1	0	0	3.67	Agreed
17	Concepts are clearly summarized	0	3	0	0	3.00	Agreed
18	Material are well organized	2	1	0	0	3.67	Agreed
19	Non technical vocabulary is appropriate	0	3	0	0	3.00	Agreed
20	Technical terms are consistently explained/introduced	2	1	0	O	3.67	Agreed
21	Pedagogy is innovative	1	1	1	0	3.oo	Agreed
22	Adequate/appropriate pre-teaching and follow-up activities are provided	1	0	1	1	2.33	Disagreed
23	Adequate/appropriate assessment/evaluation are provided	1	0	1	1	2.33	Disagreed

Key:
SA -Strongly Agreed
A- Agreed
D- Disagreed
NA- Not applicable

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Table 6: Frequency Count and Mean responses of experts on sand casting video package on technical design

S/No.	Item Statement	Freq. Count				Mean	Remark
		SA	A	D	NA		
24	Appropriate support materials are provided	1	2	0	0	3.33	Agreed
25	Visual design is interesting/effective	1	2	0	0	3.33	Agreed
26	Illustration/visuals are effective/appropriate	2	1	0	0	3.67	Agreed
27	Character size/typeface is appropriate	3	0	0	0	4.00	Agreed
28	Layout is logical and consistent	2	1	0	0	3.67	Agreed
29	Packaging/design is suitable for the classroom/library	1	2	0	0	3.33	Agreed
30	User can easily employ the resource	1	2	0	0	2.67	Agreed
31	Resources make effective use of various medium	1	1	0	0	2.33	Disagreed
32	DVD/video extends or builds upon students' knowledge	1	2	0	0	2.67	Agreed
33	Sequencing (chunking) allows for appropriate contextual pauses in viewing	1	1	0	1	2.66	Agreed

Key:
SA -Strongly Agreed
A- Agreed
D- Disagreed
NA- Not applicable

Research Question Two

What is the reliability of the developed instructional video package for teaching sand casting at technical college level?

Data for answering this research question is present in table 7 & 8

Table 7: Summary of Cronbach alpha reliability of the developed video package instrument

S/No.	Area	KR20	No. of Items	Remark
1	Knowledge	0.89	**60**	
2	Attitude	0.79	**15**	
Total			**75**	

The data for the reliability coefficient on multiple choice items on knowledge and attitude are given in Table 7.

Analysis in table 7 revealed that the 60 test items on knowledge had a reliability coefficient of 0.89 and 15 items on attitude had a reliability coefficient of 0.79. The analysis therefore revealed that the developed instruction video package is reliable for teaching sand casting since the test items blue print show high reliability.

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Table 8: Summary result of psychomotor domain (skill)

S/No.	Task	Cronbach Alpha	No. of Items	Remark
1	Pattern and pattern making	0.79	29	
2	Mold and core making	0.76	21	
3	Sand casting techniques	0.71	10	
Total			**60**	

Analysis in Table 8 revealed that each of the 3 task areas with the 60 process skills in pattern and pattern making, mold and core making, sand casting process had a high reliability ranging from 0.65 to 0.91.

Therefore, considering the reliability coefficient of 0.89 on knowledge items and 0.79 on attitude items as revealed in table 7 and those revealed in table 8, it is justifiable to conclude that the developed video package was valid for teaching and the test that produced the package also reliable for testing the effect of the developed sand casting video. Therefore, the analysis in table 7 and 8 revealed that the entire instrument was reliable. The level of reliability in the tables is in line with the recommendations of Uzoagulu (2011) who pointed out that the acceptable reliability of instrument use in education is within the range of 0.50-0.95. Therefore, given the high reliability coefficients for the test items, the answer to the research question about the reliability of the tests would be in the affirmative

VII. SUMMARY OF MAJOR FINDINGS

i. The developed instructional video package and SCAT were found to be valid for teaching sand casting

ii. The developed instructional video package and SCAT were found to be reliable for teaching sand casting.

VIII. DISCUSSION OF RESULTS

i. Validity of the developed sand casting instructional video package

The multiple choice items of knowledge, attitude and task of psychomotor (skill) of content validation of the developed sand casting instructional video package (instrument) by constructing a table of specifications based on Andeson and Krathwohl (2001) shows 40.6% remember, 39% understand , 11% apply, 6% analyze, 1.7% evaluate, and 1.7% on create. On the attitude in affective domain of learning, a table of specification was also constructed based on Bloom, Krathwhol and Madia (1973) Model on affective domain shows that 13.5% Receiving, 33% Responding, 20%Valuing, 20% Organizing and 13.5Internalizing and the factors that boarder on attitude are; emotional stability, honesty, trustworthiness, whereas psychomotor domain (skills) test items were constructed based on the six level of Simpson (1972) shows 10% perception, 25% set, 13% guided response, 12% mechanism, 48% complex over response, none on adaptation and none on origination. This signified a balanced in the spread distribution of the knowledge, attitude and psychomotor skill items across the

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six levels, seven levels and six levels respectively. The assertion of Fatunsin (1996); Odu (2011) and Bukar (2006) that the fairer the degree of distribution of the test the better representation of the behavioral domain and the higher the content validity of the test.

Therefore, the results of the content validation of sand casting instructional video instrument by using 3 experts from Vocational and Technology Department ATBU Bauch, 3 technical teachers and 2 workshop instructors to critique the wording and the adequacy of sampling of the items and also flow and sequence of the knowledge, affective and skill task. The activities of the multiple choice items revealed that all the 75 items which covered 25% on foundry shop safety precautions, 15% on sand casting tools and equipment, 18% pattern and pattern making, 22% on mold and core making, 20% on sand casting techniques while 15% items on attitude whereas 60 items on the psychomotor skills shows 47% sub task of pattern making. 37% sub-task on mold making and 16% on sand casting techniques were all worded and representative enough in terms of the content areas in the curriculum. Also, 3 experts, 2 from the Educational Technology Department and 1 from Metal Work Department examined the developed sand casting instructional video package based on Province Edward Department of Education (2008) DVD/Video validation criteria in terms of three important areas content, instructional design and technical design where 8 items on content, 15 items on instructional design and 10 items on technical design. The results show that content is current, accurate, support NABTEB foundry curriculum scope and depth of the topics are appropriate to students needs; materials have significant Nigerian content, concepts are clearly introduced, non technical vocabulary is appropriate, technical terms are consistently explained/introduced volume and quality of sound are appropriate, narration, music, and sound are effective and appropriate to instructional purposes, visual effects and transitions are use appropriately. This signified the adequacy of sampling areas in the curriculum in which sand casting instructional video and SCAT designed to teach and assess. These results were consistent with the views of Woodworth (1998) that a test if the achievement, attitude and performance test it assesses corresponds to the objectives it is supposed to assess.

ii. Reliability of the developed sand casting instructional video package

The findings relating to the internal consistency of the achievement test on knowledge revealed that the foundry shop safety precautions, sand casting tools and equipment, pattern and pattern making, mold and core making and sand casting techniques had a reliability coefficient 0.89 while that of affective had a reliability coefficient 0.79.(Appendix H, p114and Appendix I, p 118) These are good enough for new test. This is because they obtained coefficient exceeded the recommendation of 0.396 for population sample less than one hundred and twenty (120) by Ogwo (1976) & Nworgu (2006). However, the findings disagree with the recommendations by Gay (1976) and UNESCO (2002) of 0.9 for new standardized test.

The findings related to skills test revealed that a coefficient of 0.79 on pattern making with 29 items while mold making had a coefficient of 0.76 with 21 items whereas 0.71sand casting techniques with 10 items and 0.86 for the entire psychomotor skills with 60 items.

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Furthermore, each of the 60 items had a coefficient ranging from 0.7 and above. This was in agreement with the recommendations by Okoro (2011) that a coefficient ranging from 0.7-1 is an inclusion of high degree of consensus between two or more examiners.

IX. CONCLUSION

The use of valid and reliable developed instructional video package as an instructional strategy was the best and makes an evaluation and teaching process complete.

XI. RECOMMENDATIONS

Based on the findings of this study the following recommendations were made;

i. Teachers should learn how to develop valid and reliable instructional video package, especially practical oriented courses/subjects in technical colleges

ii. Government should provide grants to TVET teachers/instructors to developed instructional video package for teaching and learning technical related courses at the technical colleges.

13. REFERENCES

1. *Akujo, C. C. & George, C. C. (2010). Assessment of Technological work skills required by Marketing Education Graduates in the world of work. Nigerian Vocational Association Journal, 15 (1), 206-213.*
2. *Anyakoha,E.U. (2009).Development research skills, concepts and conceptual frame work. Nsukka: Great AP Express Publishers Ltd.*
3. *Bukar, B. (1994). Development of an Instrument for Evaluating Practical Projects in Electrical and Electronics . Enugu, Nigeria: University of Nigeria.Nsukka .*
4. *Fatunsin, F. (1996). Development and Standardization of Performance-based tests in Agricultural Science in Ondo State. (Unpublished PhD. Thesis) Department of Vocational Teacher Education, University of Nigeria, Nsukka.*
5. *Gay, L.R. (1981). Educational Research; Competencies for Analysis and Application (2nd ed). Columbus: Charles E. Merrill publishing Co.*
6. *Krathwohl, D. R., Bloom, B.S. and Masia. B.B. (1964) Taxonomy of Educational Objectives: Affective Domain. David McKay: New York.*
7. *National Board for Technical Education (2003). Revised Curriculum For Technical Colleges. Kaduna, Nigeria: NBTE.*
8. *Nwabueze, E. (2009). Research Methods an Integrated Approach. Enugu, Nigeria: ABIC Books & equip. Ltd.*
9. *Ofuebue, C., & Izueke, E. (2011). Data Demands for Development Research. Enugu, Nigeria: Prince Digital Press.*
10. *Ogwo, B. A., & Oranu, R. N. (2006). Methodology in Informal and Non-form Technical/Vocational Education. Enugu, Nigeria: Nsukka University of Nigeria Press Limited.*
11. *Okoro, O. M. (2002). Measurement and Evaluation in Education . Obosi, Nigeria: Pacific Publisher Ltd.*
12. *Olaitan, S. O., Ali, A. Eyoh, E. O., and Sowande, K. G. (2014). Research in Education and Social Sciences. Onitsha. Cape publishers International Ltd.*
13. *Paiko, E.J. (2014). Development of an Audio-Visual Package for Teaching Sand Casting Techniques in College of Education in North-West Sub Region of Nigeria. Unpublished Ph.D. Thesis. ATBU Bauchi, Nigeria.*
14. *Province Edward Department of Education (2008) Evaluation and Selection of Learning Resource: A Guide. Retrieved March 7, 2017, from http:/www. gov. pe.ca/educ.*

ISSN 2581-5148

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15. UNESCO (2012). Information and Communication Technology in Teacher Education: A Planning Guide. Paris UNESCO Retrieved on May 6, 2016 from
http://www.unesdoc.org/images/0012/001295/12533/ pdf.
16. Uzoagulu, A. E. (2011). Interpretation of Research Results. (E. Eze, Ed.) Retrieved March 7,2017, from Foundation of Research in Education:
http://www.unesdoc.org/images/0012/001295/12533/pdf
17. Yalams, S. M. (2001). Development and Validation of Metal Work Process Evaluation Scheme. Enugu,Nigeria: Unpublished Ph.D. Thesis UNN Ltd.